Equipment and Tree Cookies

A **Wood Magic Forest Fair** learning station for 4th graders

2023 edition (new science standards highlighted in yellow)

Overview

These are two different 10-15 minute lesson plans that should be done during the **popcorn and lunch break**. Allow the students plenty of time to eat, but as they start to get antsy, please start the lesson. This is a more informal station that the others, so do not feel you have to cover everything that is in this lesson plan. Feel free to focus on content that you feel comfortable covering. The logging equipment will be displayed near the food tent/building. Please do not let the students climb on the equipment.

2021 SC Science Standard

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function together in a system to support survival, growth, behavior, and reproduction.

Materials

Tree cookie examples showing varying growth rates in the rings *(do not allow students to keep these)*
Increment borer
Logging equipment (skidder and/or feller buncher)
4 signs depicting equipment and logging operations (will be set up around the equipment)

Step-by-Step Procedures

LESSON 1 - LOGGING EQUIPMENT

Many years ago, logging was done by hand, perhaps with the help of animals. Nowadays it is done much more with machines. A typical logging job in South Carolina does not have anyone on the ground doing the main job of logging; however, there usually is someone on the ground conducting maintenance or some type of cleanup. This makes harvesting timber much safer than it was done historically.

The 5 primary operations in a logging job are felling, skidding, sorting, loading and trucking.

Next will vary depending on what logging equipment is present. Use physical gestures and pointing to pictures as this is explained.

Typically, felling is done with a feller-buncher. It grabs a tree with the grapples (show students), cuts it off with the powerful saw blade (show students cautiously), and continues to hold it up while grabbing and cutting another tree, thus creating a bunch of trees. That bunch could be a number of small trees or one large tree. The operator then looks for a good location and lays the bunch down for easy access by the skidder. If at Harbison State Forest, compare to the old steam-powered log skidder.

The skidder grabs the bunch of trees with the claw-like hand at the back, lifts up the butt end of the trees, and pulls them to the deck.

At the deck, the trees are sorted, depending on what the tree is like and what mill it will be delivered to. They are then loaded onto a truck. All of this might even be done by one operator. The load is then delivered to the mill.

A logging job will likely have one feller-buncher, 3 skidders, a loader, several trucks and a number of log trailers. How much do you think this piece of equipment costs? **Interact with kids**. New, it runs about $250,000 **(investigate beforehand**). The total cost of this equipment could be $2 million or more.

A logger is a small businessman. He or she could have invested that money in a Burger King or a laundromat, but they chose to invest in a logging business. They contract to provide a valuable service to all of us, by harvesting trees and moving wood to mills to make all those things we need. Loggers are trained and certified to log effectively and safely and protect the environment.

LESSON 2 - TREE COOKIES

A forester is someone who has learned how trees grow, how to measure them, take care of them and manage them for use.

Hold up large tree cookie. This is called a tree cookie. It was cut from the end of a log from a tree that was being harvested. On the outside of this tree cookie is a layer called the bark. Does anyone know the job of a tree's bark? **Interact with kids.** The tree bark is the tough exterior that protects the tree from injury caused by insects and other animals, by other plants like ivy, by disease, and by fire. Underneath the tree bark is a thin layer of living tissue called the cambium. The cambium is the growing layer that produces more wood.

Can anyone tell me how you can tell how old this tree was? **Interact with kids.** That's right, you count the rings. Now, should you count the dark rings, the light rings, or both? **Interact with kids.** You should count only one of the kinds of rings; either the dark or light rings. I always count the dark rings; I just find it easier. This cookie has 24 rings on it; therefore, it is 24 years old.These rings come about by how trees grow; they grow faster in the spring, and more slowly later in the year.So the light rings are called springwood, and the dark rings are called summerwood. The springwood grows during the wet spring growing season whereas the drier summer growth slows forming the summerwood.

Hold up smaller cookie alongside the larger tree cookie. Here's another cookie. How old do you think the tree is from which this tree cookie came? Which do you think came from an older tree? **Interact with kids.** The smaller one; it has 32 rings on it. So, what gives? Could be species, but they are the same species.

Who can tell me what a tree needs to grow? **Interact with kids. Looking for nutrients, water, sunlight. Space may help provide them (have learned at Good Fire/Bad Fire station if they have been there).** So when I look at this smaller cookie I know that this smaller one was missing something. Maybe really sandy site, without much water and nutrients. Maybe really crowded, so having to fight for all 3 of those things – nutrients, water, and sunlight. Also, the forest may have been struck by insects, diseases or wildfires which would slow growth.

Point to rings widening on big cookie. I can see something pretty cool when I look at these rings. See how the rings are getting narrower and narrower as the tree gets older? That's pretty normal. First, as the tree gets bigger, it is just harder to grow as much diameter. But often, if it is growing around other trees the same age, it starts having to compete with other trees for those 3 key resources. Trees around it are getting bigger too. Now, look here where the rings all of a sudden get wider. The tree could grow better; it had more resources. Maybe a wind storm knocked down trees around it.

But I know that what happened here is a forester visited the stand, determined that the trees were growing too slowly, and decided to do something about it. So they did a thinning; they harvested some of the trees and took them to a mill. That left more room – and more of those resources- for the remaining trees to grow. And voila! It worked! That is an example of forest management; foresters are trained to manage forests to help them grow well.

Hold up increment borer, apart. How could a forester tell the trees weren't growing well? Sometimes just by looking at a tree or sometimes by seeing how crowded they are. You certainly wouldn't want to cut a tree

down just to see the rings. Here's an increment borer. This screws into the tree, and then this little plug is pulled out with this tray. We foresters call these plugs increment cores. See the rings on the core? **Show around.**

Note: Depending on the circumstances, it can be very interesting to students to actually demonstrate an increment borer at a break, probably lunch time. This is best done with a one-class group that can gather around. Good for the two instructors to split up and take a class during lunch to bore a tree with the increment borer.